

WORKING DRAFT for 2006:
**Interim Protocols for the Capture, Handling, and Tagging of Wild
Salmonids in the Upper Columbia River Basin using Passive Integrated
Transponder (PIT) Tags**

Introduction

The objective for this document is to establish interim working protocols for the capture, handling, and tagging of wild salmonids in the Upper Columbia River Basin using Passive Integrated Transponder (PIT) tags. Final protocols will be developed pending additional review after these interim protocols are evaluated during the 2006 field season.

The goals of developing standardized protocols are 1) to reduce injury and mortality of captured, tagged, or handled fish, 2) to reduce potentially confounding between-crew measurement error that could arise if crew-specific field practices introduce variability in tag shed rates or post-tagging mortality, 3) to facilitate the logistics of intra- and inter-agency collaboration in the use of PIT tags for research and monitoring in the Upper Columbia, 4) to insure that PIT tagging operations at smolt traps do not compromise the ability to calculate smolt production estimates, and 5) to facilitate future applications for permits and funding.

These protocols were developed in collaboration with the Integrated Status and Effectiveness Monitoring Program (ISEMP), Washington Department of Fish and Wildlife (WDFW), NOAA-Fisheries (NOAA), Chelan Public Utility District, Yakama Nation (YN), U.S. Fish and Wildlife Service (USFWS), and the Upper Columbia Regional Technical Team (RTT) Monitoring Committee.

These interim protocols will be first applied by crews collaborating with the ISEMP Program in the Wenatchee, Entiat, and Methow rivers in 2006. Results of the application of these protocols will be reviewed prior to the adoption of final protocols. This delay in adopting final protocols is also intended to allow other Upper Columbia agencies an additional opportunity to provide input on this document.

Protocols Common to All PIT Tagging Regardless of Location

General

All the necessary permits required for fish capture, handling, and tagging operations must be obtained. Collectors and PIT taggers are responsible for obtaining and maintaining all necessary permits. The provision of tags or funding for these operations by NOAA does not confer permit authorization.

Individual agencies may have additional protocols that govern the capture, handling, and tagging of wild salmonids. Care should be taken in the application of other protocols so they are at least, if not more, conservative regarding fish health and scientific study designs. Logistical difficulties that could arise from the application of additional protocols should be worked out and

documented among the affected parties. Differences between other agency requirements and this document should be noted for subsequent revision of this document.

All capture, handling, and tagging should be undertaken within a proper study design that describes, at a minimum, the capture, tagging, and release locations, species, life-stage, and number of individual fish to be tagged. Individual fish to be tagged should be larger than a minimum fork length, given by species in Table 1.

Table 1. The minimum size of juvenile salmonids that will be PIT tagged.

Species	Minimum fork length (mm)
Chinook	60
Steelhead/Rainbow trout	60
Sockeye	80
Coho	60

PIT Tag File Naming Convention

A standardized approach to naming PIT tagging files will assist with data transfer, storage, and analysis. The following naming convention is an extension of the PTAGIS naming convention that allows for eight characters preceding the decimal point and three characters following the point. These 11 characters will denote information described in Table 2 and Table 3. For example, a file called <ARM06123.AAB> would contain data collected by a crew working for Andrew R. Murdoch for steelhead tagged on the 123rd Julian day of 2006 at the Chiwawa River smolt trap that were released as part of a trap efficiency trial. Care should be taken to make sure fish are released prior to submitting tagging files to PTAGIS to avoid the possible need to edit a previously submitted file.

This format does not apply to PIT recapture files. PIT recapture files will be submitted weekly using variable release times (VRT). File names of recapture files will be determined by the agency submitting the files.

This naming convention allows for many additional locations, capture methods, and release dispositions to be recorded. Suggested additions to Table 3 should be forwarded to the group of agencies who developed these protocols¹. These agencies will further develop this document in the fall of 2006 and will determine a way to promptly update elements of this document, like Table 3, during sampling periods.

¹ Mike Ward has the current email list as of 4/11/06.

Table 2. A description of the 11-character file naming convention for PIT tag files.

Variable	Example	Description
Character 1-3	ARM	PIT tag coordinator initials
Character 4-5	06	Year tagged
Character 6-8	123	Julian day of the year
Character 9	A	Location (See Table 3)
Character 10	A	Capture method (See Table 3)
Character 11	B	Various (See Table 3)

Table 3. Codes and descriptors for the three character spaces to the right of the decimal point in PIT tag file names.

Code	Location (Character 9)	Capture Method (Character 10)	Disposition/File Number (Character 11)
A	Chiwawa	Smolt trap	Chinook used in efficiency trial
B	Nason	Seining	Steelhead used in efficiency trial
C	Upper Wenatchee	Snorkel seining	All fish used in efficiency trial
D	Lower Wenatchee	Electroshock	All fish released downstream of capture location
E	Wenatchee	Angling	All fish released upstream of capture location
F	White	Snorkeling	All fish released at capture location
G	Peshastin	Tumwater Fish trap	
H	Entiat	Dryden Fish trap	
I	Mad	Wells Dam	
K	Methow		
L	Twisp		
M	Chewuch		
N	Okanogan		
O	Little Wenatchee		
P			
Q			
R			
S			
T			
U			
V			
W			
X			
Y			
Z			
1			Number of files with identical name
2			Number of files with identical name
3			Number of files with identical name
4			Number of files with identical name
5			Number of files with identical name
6			Number of files with identical name
7			Number of files with identical name
8			Number of files with identical name
9			Number of files with identical name
0			

PIT Tag File Contents

Data that will be recorded in the PIT tag file header template will include:

- a. Tag date and time
- b. Tag file name
- c. Session message: The session message will record the location of the catch and release sites in latitude/longitude in decimal degrees following rules in Table 4. These rules are necessary to allow for automated extraction of GPS data within the Upper Columbia data management system that is under construction. Use GPS datum NAD83.
- d. Tag site code (e.g., Trap code)
- e. Tagger
- f. Coordinator ID
- g. Organization
- h. Tag method (i.e., hand)
- i. Tagging temperature
- j. Migratory Year (i.e., current year)
- k. Capture method code
- l. Release kilometer
- m. Release date and time

Data that will be recorded in the tagging file will include:

- a. Species Run Rear
 - i. Wild spring Chinook
 - ii. Wild summer steelhead
 - iii. Wild summer sockeye
 - iv. Wild coho
 - v. Hatchery spring Chinook
 - vi. Hatchery summer steelhead
 - vii. Hatchery summer sockeye
 - viii. Hatchery coho
- b. Length (Fork length to the nearest mm)
- c. Weight (Weight to the nearest 0.1g)
- d. Conditional comments
 - i. All applicable miscellaneous injury or mortality codes
 - ii. Subyearling or yearling (Chinook only)
- e. Text comments
 - i. Stage of smoltification (Smolt, transitional, or parr) code: S, T or P
 - ii. Trap efficiency trial (if applicable), trap specific defaults will be determined; code: E

Table 4. Format convention of catch and release site location data to be included anywhere within the session message.

Catch and release locations should be included in the session message in the following manner:

CATLAT(xx.xxxxxx)CATLONG(yyy.yyyyyy)RELLAT(ww.wwwwww)RELLONG(zzz.zzzzzz)

where:

xx.xxxxxx = latitude of catch site in decimal degrees with 6 decimal places

yyy.yyyyyy = longitude of catch site in decimal degrees with 6 decimal places

ww.wwwwww = latitude of release site in decimal degrees with 6 decimal places

zzz.zzzzzz = longitude of release site in decimal degrees with 6 decimal places

Note that latitudes have 2 characters before the decimal and longitudes have 3 characters before the decimal. The GPS units may vary on how many decimal places they provide – either round down to 6 places or add trailing zeros if necessary but always use 6 places after the decimal.

Use the codes “CATLAT()” “CATLONG()” “RELLAT()” “RELLONG()” to identify the fields and be sure to use this standardized spelling including parentheses so lat/long data can be automatically extracted from these files. Do not use commas, other punctuation, or any extra spaces to separate the fields.

Capture, Handling, and Tagging at Non-Smolt Trap Sites

Collection

The location of fish collection and tagging will be determined by the needs of the specific study and should be done in coordination with other researchers who might be snorkeling or collecting fish for other purposes in the same areas. If study designs do not specify otherwise, fish will be collected and tagged from areas of high parr concentration located by snorkeling in advance of collection.

To minimize collection stress, all fish collection, handling, and tagging activity will be curtailed when water temperatures reached 16°C² or when any other occurrence suggests fish are being adversely affected. Fish may be held in live boxes and tagged the following day if water temperatures allow. Otherwise, fish will be released immediately. Oxygen will be supplied to fish-transfer and recovery containers during tagging operations.

Three collection methods will be used: electrofishing, low-impact seining, and angling. In general, seining will be the preferred method due to its relative benefits to fish health and its capture efficiencies, but the actual method to be used will depend on fish density, site characteristics, and study design.

Seining

Seining is most feasible in pool, run, and meadow habitats where the substrate is fine-grained and wood is sparse, and where fish densities are high. Position one seine securely across the lower end of a run or pool and place a second seine across the stream, approximately 10 m upstream. Move the upper seine downstream, gently crowding fish toward the lower seine. As

² The upper temperature threshold for PIT tagging is 17°C but fish collection, handling, and tagging will be curtailed at 16°C in anticipation that water temperatures could quickly warm and exceed the 17°C threshold.

the lead line of the upstream seine crosses the lead line of the downstream seine, pull the lower seine up out of the water, trapping the fish.

Captured fish can be maintained in ambient water by allowing the center of the seine to remain submerged. Fish will be transferred from the seine in a watertight sanctuary dip net (Matthews et al. 1986) to a 20-L bucket. When approximately 30-50 fish have been collected they will be portaged to live cages for subsequent tagging in a 20-L carboy container equipped with an oxygen-based aeration system mounted on a backpack frame.

Electrofishing

Electrofishing will be used in streams where low fish densities or difficult terrain preclude successful seining. Operate the electrofisher according to manufacturer, NOAA and other appropriate agency guidelines. Stunned fish will be collected from the river with standard netted dip nets and placed in 20-L buckets and portaged to the live cages as described above. When electrofishing the following additional procedures should be conducted:

Record the conductivity or adjust settings based on previous sampling. Start at the most downstream collection site and work upstream. In medium-sized streams use a crew (3 + 1) on each side of stream consisting of a shocker, a netter, a bucket-person with fish counter, and a fish packer/redd/adult spotter. Electrofish in water no greater than one meter in depth. Let off power once fish turns and quickly net them and put in bucket. Transport fish after 30-50 parr (20-30 if mixed species) are collected in the bucket or at least every hour, replace/add fresh water to bucket frequently and make sure the oxygen is working properly. If the spotter finds adult fish or redds, the crew will exit the stream and reenter upstream at a point that will ensure protection. Use care in entering/exiting stream, so not to break banks down. The shocker will call out the number and species of fish observed (but not collected) that are to be counted by the bucket-person. The bucket-person will tally, using the multicounter, all fish observed but not collected and all fish captured and placed into the bucket. Record all information on the data sheet. After tagging, all fish will be released throughout the area from which they were collected.

Angling

Angling may be used in most situations, especially in cases when other capture techniques are not efficient at capturing all target life stages. This capture method, particularly when done in waters closed to public angling, requires close coordination with local law enforcement and heightened public outreach.

Single barbless hooks will be used at all times. If multiple methods (i.e., seining and angling) are used during the same day, anglers should be upstream of the other crew and whenever possible avoid disturbing fish by walking on the edges of the stream. All fish captured will be recorded. All target species will be placed in 20-L buckets and portaged to the live cages as described above. Non-target species will be immediately released. When all sampling is completed, tagged fish will be released throughout the area from which they were captured.

Other methods

Some permit holders may be allowed to capture fish by other methods. For example, USFWS is permitted to capture fish with fyke nets and minnow traps. These capture techniques will be applied according to protocols determined by the permitted agency. All fish captured will be recorded. All target species will be placed in 20-L buckets and portaged to the live cages as described above. Non-target species will be immediately released. When all sampling is completed, tagged fish will be released throughout the area from which they were captured.

Inserting PIT tags

Fish will be tagged using individual modified syringes and hypodermic needles (Prentice et al. 1990). To minimize disease transmission, tags and all associated equipment will be disinfected for a minimum of 10 min with isopropyl alcohol.

Tagging will be conducted at portable stations designed and constructed specifically for use beside streams. These stations may either be trailer-mounted stations constructed by Chelan PUD or will be constructed following the guidance of Prentice et al. (1990) and Achord et al. (1996).

Fish will be dipped from the live cage with a sanctuary dip net and poured into a plastic pan containing a stock solution of tricaine (MS222, final concentration of about 40 mg/L). After anesthesia, fish of other species and target species not suitable for tagging (i.e. injured or too small) will be sorted and removed for recovery and released back to the stream. Each remaining target fish will be injected with a PIT tag following procedures published by PTAGIS.

Tagged fish will then be passed through a detector loop to record the tag code in the computer-tagging file that includes species, run and rearing type, and file header information specified above. The fish will be measured to fork length (to nearest mm) and weighed (to nearest 0.1 g) and species, run, life stage, and conditional comments will be recorded.

After tagging, fish will be allowed to recover in fresh water, transferred back to a live cage in the stream, and held for a minimum of 0.5 h before being released as close as possible to the location where they had been collected. Approximately 10% of each group of tagged fish will be held in a live box for 24 h to evaluate tag loss and delayed mortality.

Capture, Handling, and Tagging at Smolt Traps

Identify and ensure all smolt trap tagging and release locations are downloaded from PTAGIS. Table 5 provides current codes and descriptions.

Table 5. Current PTAGIS tagging and release location codes and descriptions for the Upper Columbia. (what about the Okanogan)

Trap Location	Description	PTAGIS code	RKM
Chiwawa trap	Rkm 1.0 on Chiwawa River	CHIWAT	754.077.002
Chiwawa River	Trap efficiency release location	CHIWAR	754.077.003
Upper Wen. trap	1.0 km below Lake Wenatchee	WENA2T	754.086
Lower Wen. trap	Trap at West Monitor Bridge	WENATT	754.010
Wenatchee River	Trap efficiency release location	WENATR	754.029
Nason Creek trap	Rkm 0.8 on Nason Creek	NASONT	754.089.001
Nason Creek	Trap efficiency release location	NASONC	754.089.002
Entiat River trap	Rkm 11 on the Entiat River	ENTIAR	778.011
Entiat River	Trap efficiency release location	ENTIAR	778.017
Methow River trap	Trap at McFarland Bridge	METTRP	843.030
Methow River	Trap efficiency release location	METHR	843.036
Twisp River trap	Rkm 2.0 on the Twisp River	TWISPT	843.066.002
Twisp River	Trap efficiency release location	TWISPR	843.066.003

1. Operate smolt traps in accordance with individual agency protocols.
2. Smolt traps are checked every morning at a minimum.
 - 2.1. The smolt trap operator will scan all salmonids regardless of species and origin for PIT tags and is responsible for uploading recapture files to PTAGIS at least weekly (every Monday in the Wenatchee).
 - 2.1.1. All non-target fish will be sampled (measured, weighed, etc.) per smolt trapping protocol.
 - 2.1.2. Any target fish initially identified to be in poor health (i.e., injury, >20% descaling) shall be enumerated and released by the smolt trap operator.
 - 2.1.3. Any previously PIT tagged fish will be recorded as a recapture and sampled (measured, weighed, etc.) per smolt trap protocol and will be released downstream from the trap.
 - 2.1.4. Non-tagged target fish will be placed in a live box for up to two days before tagging although daily tagging will be the default.

3. Non-tagged target fish will be removed from the live box and tagged.
 - 3.1. PIT tagging will follow procedures published by PTAGIS.
 - 3.2. Fish will not be PIT tagged when water temperatures exceed 17°C.
 - 3.3. For each PIT tagged fish, PIT taggers will measure fork length (to nearest mm) and weight (to nearest 0.1 g), and will identify each fish by species, run, life stage, and condition.
 - 3.4. To document injury or mortality, to relieve stress, and to check for tag retention all PIT tagged fish will be held in a live box after tagging until fully recovered. This live box will be different from live boxes used for trapping operations or used for holding un-tagged fish.
 - 3.4.1. Fish from the live box will be released to the stream by the smolt trap operators depending on the needs of the smolt trap operators. Each release from the live box will constitute a “release group” and will be treated as such in PIT tag files.
 - 3.4.1.1. In general, fish will be released below the trap. However, in some cases, fish will be released upstream of the trap as part of a trap efficiency trial.
 - 3.4.1.1.1. If no trap efficiency test is planned, fish will be released below the trap after being held for 24 hours.
 - 3.4.1.1.2. If a trap efficiency test is planned and requires the accumulation of fish from multiple days, the release group must include some individuals that have been held for a minimum of 24 hrs to assess mortality and shed rate.³
 - 3.4.1.1.3. When possible, fish intended for use in trap efficiency trials will be sampled and marked per smolt trap operation protocol simultaneously with PIT tagging operations.
 - 3.4.1.2. In all cases, fish will be released from the post-tagging live box within 3 days.
 - 3.4.1.3. No fish will be held for more than a total of 3 days from the time they were removed from the trap.
 - 3.4.2. PIT tagged fish may be externally marked with fin clips for trap efficiency trials or for tissue sampling but care will be taken to insure that all fish from a release group are equally likely to be externally marked (e.g. for a release group accumulated over 3 days, do not clip only fish caught on the same day; instead, select fish equally from across the 3 days catch).

³ Pending assessment of tag retention and mortality in 2006, we may require a smaller fraction of fish to be held for a minimum of 24 hours after tagging compared to the approximately 2/3 that will be held for 24 or 48 hours under these protocols.

- 3.4.3. In 2006 and possibly subsequent years, WDFW will evaluate trap efficiencies at the Chiwawa River trap using paired releases of PIT tagged and fin clipped fish to determine whether PIT tagged fish could replace the use of fin clipped fish in trap efficiency tests.
4. PIT tagged fish will be released by the smolt trap operator at the end of the post-tagging holding period. All mortality and shed tags will be recovered and delivered to the PIT tagging crews as well as release information, including time and location.
 - 4.1.1. The smolt trap operator will decide on the disposition of tagged fish: they will be used either for trap efficiency trials or will be released below the trap. Trapping crews will notify the tagging crew of the disposition of each batch of tagged fish; this information will affect the final tag file name. The default disposition will be that fish will be used for trap efficiency trials except at Monitor and the Upper Wenatchee trap where the assumed disposition will be that fish will be released below the trap.
5. The PIT tagging crew will upload tagging files to PTAGIS twice per week (every Monday and Thursday in the Wenatchee).